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(54) Title: METHOD AND SYSTEM FOR END-TO-END COMMUNICATION OVER THE INTERNET TRANSMISSION INFRASTRUCTURE

(57) Abstract: The present invention is a method and a system providing End-to-End communication ability through the Internet (7). Subscribers (3, 4) would be able to make direct service connection to each other, avoiding most of the carrier's exchanges. A user (3, 4) would be able to send Emails directly without mediation of servers and would be able to conduct a phone-call, hold fax, data and video sessions, and emit sensing and controlling signals in the same way. The present invention provides personal/SOHO services such as web hosting, E-commerce, video and other Internet services that emanate from having a server (2) at the end-user's premises (1), and also provides remote control of electronic appliances, their metering and sensing. The method and the system, of the present invention, are for use by any communication device to enable communication between subscribers of the said system or between a subscriber (3, 4) of the system and a non-subscriber (5c) as well.

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Method and System for End-to-End Communication over the Internet transmission Infrastructure

5 **FIELD OF THE INVENTION**

The present invention relates to the field of communication methods and systems. More specifically, the present invention relates to the field of End-to-End communication through the Internet transmission
10 infrastructure.

There are several ways, methods and systems to communicate. One of the wide spread communication facilities is the Internet transmission network, which enables the user to connect through the
15 network from most places on the globe by using fiber, wire line, cellular, radio and satellite infrastructure channels or a combination of them.

The known existing network communication methods use switches and / or gateways to establish a connection.
20

BACKGROUND OF THE INVENTION

The Internet is a network comprised of digital packet transmissions means connected by routers. Each connected mean, which usually is a
25 router, has a unique IP address to be used by other routers to locate it. An Internet user can be connected to an Internet-Services-Provider (ISP) or to an Internet Point-Of-Presence (POP). The user is held in the ISP domain and the ISP enables the user to communicate in the Internet by

allocating him a temporary IP address. The user can use the known IP addresses to connect to any server or web site or to any other user that, at the same time, is connected to the network in another server domain.

5 The Internet user connects, via any available infrastructure, to the ISP, which provides Internet services and enables the user to surf the Internet. As to E-mails, the ISP usually allocates a mailbox in its domain for the user to save the incoming E-mail and the user can draw the mail from its ISP at his initiation.

10

SUMMARY OF THE INVENTION

 The present invention provides End-to-End communication ability.

15 Subscribers would be able to make direct service connection to each other, avoiding most of the carriers' exchanges. A user would be able to send Emails directly without mediation of servers and would be able to conduct a phone-call, hold fax, data and video sessions, and emit sensing and controlling signals in the same way. The present invention provides

20 personal/SOHO services such as web hosting, E-commerce, video and other Internet services that emanate from having a server at the end-user's premises, and also provides remote control of electronic appliances, their metering and sensing.

25 The same architecture, and the technical capabilities of the invention and services enabled by it, are applicable and can be used by and for a larger enterprise organization.

The present invention is a method and a system to establish End-to-End communication, wherein each end-subscriber user can be anywhere on the globe, using the Internet network. The method and the system, according to the present invention, are for use by any communication device to enable communication between subscribers of the said system or between a subscriber of the system and a non-subscriber as well.

The method, according to the present invention, is a method to establish End-to-End communication comprising the following steps:

- (a) Installing a local unit (IPCenter) at the subscriber's premises wherein the IPCenter is connected to the Internet, via any independent infrastructure (when any IPCenter can be connected to the Internet network by dialup or dial-in to the closest entry point of the Internet network (POP) and any IPCenter can be connected to the Internet network via broad band and/or narrow band connection or fiber connected to the Back-Bone or any other communication means that connects the last mile into the Internet), and the IPCenter has an assigned IP address while connecting;
- (b) Each subscriber receives a global-unique name and/or number, using a global naming-numeric-scheme;
- (c) Connecting the communication devices and electronic appliances and the networks of the end-user premises to the IPCenter via any end-user premises infrastructure;

- (d) Connecting to a main Master-Server in the Internet, which has a registered Internet Universal-Resource-Location (URL) wherein all the IPCenter units are sub zones of the said Master-Server;
- (e) Organizing the subscribers' data in the Master-Server to find an IP address according to a subscriber name, using the global naming-scheme wherein each subscriber has a unique Domain-Name;
- (f) When a device in the subscriber's premises is activated, the IPCenter identifies the device and determines the kind of communication that ought to be made to the required addressee (either dialed phone number, E-mail address or other) and has available the name or number of the addressee;
- (g) The IPCenter connects to the Master-Server to find out if the addressee is a subscriber or not, and the Master-Server converts the name or the number to an IP address in the case of a subscriber;
- (h) If the IPCenter recognizes that a connection has already been made in the past with the required addressee, it takes the destination IP-address from a local memory history table;
- (i) If the addressee is a system subscriber, the originating IPCenter connects directly, using the Internet routers and the given IP address, to the addressee IPCenter;
- (j) The addressee IPCenter acts as a local device and establish the communication through the electronic devices connected to it;
- (k) The IPCenter includes an electronic circuitry that converts analog signals to digital ones - and digital to analog - where and when needed;

- (l) If the addressee is not a system subscriber, the IPCenter establishes the communication using the existing facilities, e.g. PSTN facilities, IP Telephony gateway or other Internet servers;
- (m) The IPCenter reports to the Master-Server the needed information for billing, Quality-of-Service (QoS), connectivity monitoring, status of connected devices and other defined information;
- (n) The method and system also provides the usual connectivity to available Internet services.

The present invention includes also a system, which uses the said method to provide communication services over the Internet. The said system is comprised of at least one Master-Server that is connected to the Internet and holds the updated information of all of the system subscribers (e.g. Domain-Name, IP address, traffic, status, etc.), an IPCenter installed in each subscriber premises wherein each IPCenter is connected to the Internet and the communication devices of the end-user premises are connected to the IPCenter and wherein the IPCenter is comprised of:

- Microprocessor, Digital-Signal-Processor (DSP) and software to perform and manage of all the IPCenter activities;
- A first input/output (I/O) unit, to connect to the Internet;
- A second input/output (I/O) unit, to communicate with the communication devices of the end-user premises;
- An analog to digital module to transform analog signals, which come from an analog communication device, to digital information;

- A digital to analog module to transform digital information, which comes from the Internet and routes it to an analog communication device, into analog signals;
- Authentication, Security and Encryption circuitry;
- 5 • Environment, RFI (Radio Frequency Interference) and electric protection circuitry;
- Vital function backup;
- Suitable input/output (I/O) connectors (e.g. Audio, Video, Fiber-optics, Cellular, RF, LAN, Data);
- 10 • Suitable physical interfaces (e.g. Infra-Red, Smart/Magnetic/Laser card readers);
- Display and/or indicators.
- IR receiver for loading software and operational functions.

15 The IPCenter can also include a data connectivity unit to operate (via USB, serial port or IrDA) through a PC, printer, scanner, palm pilot or video camera and can also include a GPS capability to be used for system registration and applications.

20 The IPCenter can also include a voice security system and/or a data security system and/or a video security system, to enable use of credit card readers, smart card readers and transmit-secure information via the network from one end to other end. Any kind of information may be secure and encrypted via the transmission and reception.

25

The system includes the ability to Push-Information from various sources into the IPCenter units, whether in a multi-cast form or a selective method. Any IPCenter can serve as a head-end to push information.

DRAWING DESCRIPTION

The present invention is described in detail in figures 1 to 4. These figures serve a descriptive purpose only and are not intended to limit the scope of the invention in any manner.

Figure 1 describes the method and the system, according to the present invention.

Figure 2 describes a subscriber's end-user premises.

Figure 3 describes a block diagram of the Master-Server.

Figure 4 describes a block diagram of an IPCenter unit.

Figure 1 describes the method and the system, according to the present invention. There are number of end-user premises (1,1a) subscribed in the system. In each end-user premises an IPCenter unit (2,2a) is installed and the communication devices (3) and the electronic appliances (4) (e.g. coffee maker) in the said end-user premises are connected to the local IPCenter. Each IPCenter is connected to the Internet. The Internet network (5) is made up of a number of data lines connected one to each other by routers (5a) and the connection to the Internet (5b) can be either through ISP or POP connection. Non-subscribed Internet user (5c) is connected to the Internet by one of the ISP's routers. The IPCenter unit is connected to the Internet through one of the ISP servers and each IPCenter has a name or number as a domain-name. One of the main components of the system is the Master-Server (6). The Master-Server holds the updated information of all of the system subscribers (including Domain-Name, IP address, traffic, status, etc.).

A transaction between two subscribers (phone calls, Email or other) will be effected directly between two IPCenter units. The originating IPCenter (e.g. 2) will first translate the required destination to an IP address by querying (7) with the Master-Server (6), and will then
5 make the connection directly (8) with the required subscriber's IPCenter (in the case of the example 2a).

Figure 2 describes a subscriber's end-user premises. In the subscriber's end-user premises an IPCenter unit (2) is installed. The
10 communication devices are connected to the IPCenter unit, e.g. FAX machine (3), telephone (3a), cable TV (3b) or LAN (3c) wherein a number of PCs (3d) are connected together with the IPCenter unit. Any end-user premises' electronic appliances (4) can be connected to the IPCenter for monitoring, metering and remote control, e.g. air-conditioner
15 or coffee machine.

The IPCenter unit is connected to the Internet (5b) either by a one of the ISPs in which case it uses the ISP router or by POP connection to a router, to communicate the Internet.

20 Figure 3 describes a block diagram of the Master-Server. The Master-Server is comprised of four main parts. The first part is the application layer and data-bases (9), which includes Internet providers' database, push technologies database, user database and billing and events database. The second part is the security layer (10), comprising a
25 firewall, and encryption and authentication means. The third part is the

communication layer (11) and the last part is the naming/numeric server (12).

Figure 4 describes a block diagram of an IPCenter unit. The IPCenter is comprised of a microprocessor CPU (13), Digital-Signal-Processor (DSP) (14) and software to perform and manage all the IPCenter activities, memory (15), security system (16), vital backup unit (17), a converter unit (18) to convert analog to digital and digital to analog. The IPCenter has number of interfaces and connection means. The wan interface (19) is to connect it to the Internet using cable, satellite, cellular, wireless, power lines or dial up modem and the LAN interface (20) is to connect the unit to a local area network. The IPCenter unit has a number of interfaces to the communication devices (21), e.g. audio, telephone, video or data and a number of physical interfaces (22) for card readers, IrDA, appliances I/O, display and others.

CLAIMS

1. A method for establishing End-to-End communication comprising the following steps:

5

(a) installing a local unit in the subscriber's premises wherein the local unit is connected to the Internet, via any independent infrastructure, and the local unit has an assigned IP address while connecting;

10

(b) each subscriber receives a unique system name or number;

(c) connecting the communication devices and the networks of the end-user premises to the local unit via any suitable end-user premises network infrastructure;

15

(d) locating and connecting to a main Master-Server in the Internet, which has a registered Internet URL;

(e) organizing the subscribers data in the Master-Server to find an IP address according to a subscriber name;

20

(f) when a device in the subscriber's premises is activated, the local unit identifies the device and determines the kind of communication that ought to be made to the required destination and has available the name or number of the addressee;

25

(g) the local unit connects to the Master-Server, and the Master-Server converts the name or the number to an IP address, unless the address is already stored in the local unit memory;

- (h) if the addressee is a subscriber or has had a connection made in the past, the local unit will connect directly to the addressee local unit, using the Internet routers and the given IP address;
- (i) the addressee local unit activates the required local device and establishes the communication;
- (j) if the communication device is an analog, the local units of the communicating party, convert the analog signal to a digital one to use the Internet, and convert digital information to analog signals to use the communication device;
- (k) if the addressee is not a system subscriber, the originating local unit establishes communication using Internet and/or non-Internet existing facilities.
2. A method for establishing End-to-End communication as claimed in claim 1, wherein the local units are IPCenter units.
3. A method for establishing End-to-End communication as claimed in claims 1 or 2 where in step (d) locating a number of region Master-Servers in the Internet and each region Master-Server has a registered Internet URL.
4. A method for establishing End-to-End communication as claimed in claims 1, 2, or 3 wherein the local units or the IPCenters are Internet sub zone of the main Master-Server or of the region Master-Server.
5. A method for establishing End-to-End communication as claimed in claims 1 to 4 wherein the name of each subscriber-premises is a global unique name, using a global naming-scheme.

6. A method for establishing End-to-End communication as claimed in claims 1 to 5 wherein the local unit or the IPCenter unit can report, to the Master-Server or to other server, the needed information for billing, Quality-of-Service, connectivity monitoring, status of connected devices and other defined information.
7. A system for End-to-End communication that uses one of the methods claimed in claims 1 to 6 comprised of:
- at least two subscriber-premises having a local unit, which is connected to the Internet and the communication devices of the subscribe-premises are connected to the said local unit;
 - at least one Master-Server connected to the Internet.
8. A system for End-to-End communication as claimed in claim 7 wherein the local unit is an IPCenter unit and the said IPCenter unit is comprised of:
- a microprocessor, Digital-Signal-Processor (DSP) and software to perform and manage of all the local unit activities;
 - a first input/output unit, to connect to the Internet;
 - a second input/output unit, to communicate with the communication devices of the end-user premises;
 - an analog to digital module to transform analog signals, which come from an analog communication device, to digital information;
 - a digital to analog module to transform digital information, which comes from the Internet and routes it to an analog communication device, into analog signals.

9. A system for End-to-End communication as claimed in claim 8 wherein the IPCenter unit contains also:

- an authentication, security and encryption circuitry;
- an environment, RFI and electric protection circuitry;
- 5 • vital function backup;
- suitable Input/Output connectors;
- suitable physical interfaces;
- display and/or indicators;
- IR receiver for loading software and operational functions.

10

10. A system for End-to-End communication as claimed in claims 7 to 9 wherein the local units or the IPCenter units are Internet sub zone of the Master-Server domain or the region Master-Server domain.

15 11. A system for End-to-End communication as claimed in claims 7 to 10 wherein each local unit or IPCenter unit has a global unique name, using a global naming-scheme.

20 12. A system for End-to-End communication as claimed in claims 7 to 11 wherein the local units' or the IPCenter units' report predetermined information to the Master-Server or to any other server.

25 13. A system for End-to-End communication as claimed in claim 12 wherein the local units or the IPCenter units report to the Master-Server the needed information for billing, Quality-of-Service, connectivity monitoring, status of connected devices and other defined information.

14. A system for End-to-End communication as claimed in claims 7 to 13 wherein at least one or more of the local units or the IPCenter units include a data connectivity unit to operate peripheral devices.

5

15. A system for End-to-End communication as claimed in claims 7 to 14 wherein at least one or more of the local units or the IPCenter units include a voice security system and/or a data security system and/or a video security system to use credit card reader and/or smart card reader.

10

16. A system for End-to-End communication as claimed in claims 7 to 15 wherein each local unit or the IPCenter unit can serve as a head-end to push information.

15

17. A system for End-to-End communication as claimed in claims 7 to 16 wherein the end-user premises electronic-appliances can be connected to the local unit or to the IPCenter for monitoring, metering and remote control.

20

18. A system for End-to-End communication as claimed in claims 7 to 17 wherein the local unit or the IPCenter includes GPS capability.

19. A method and a system for establishing End-to-End communication, substantially as shown and described herein above.

25

20. A method and a system for establishing End-to-End communication, substantially as illustrated in any of the accompanying figures.

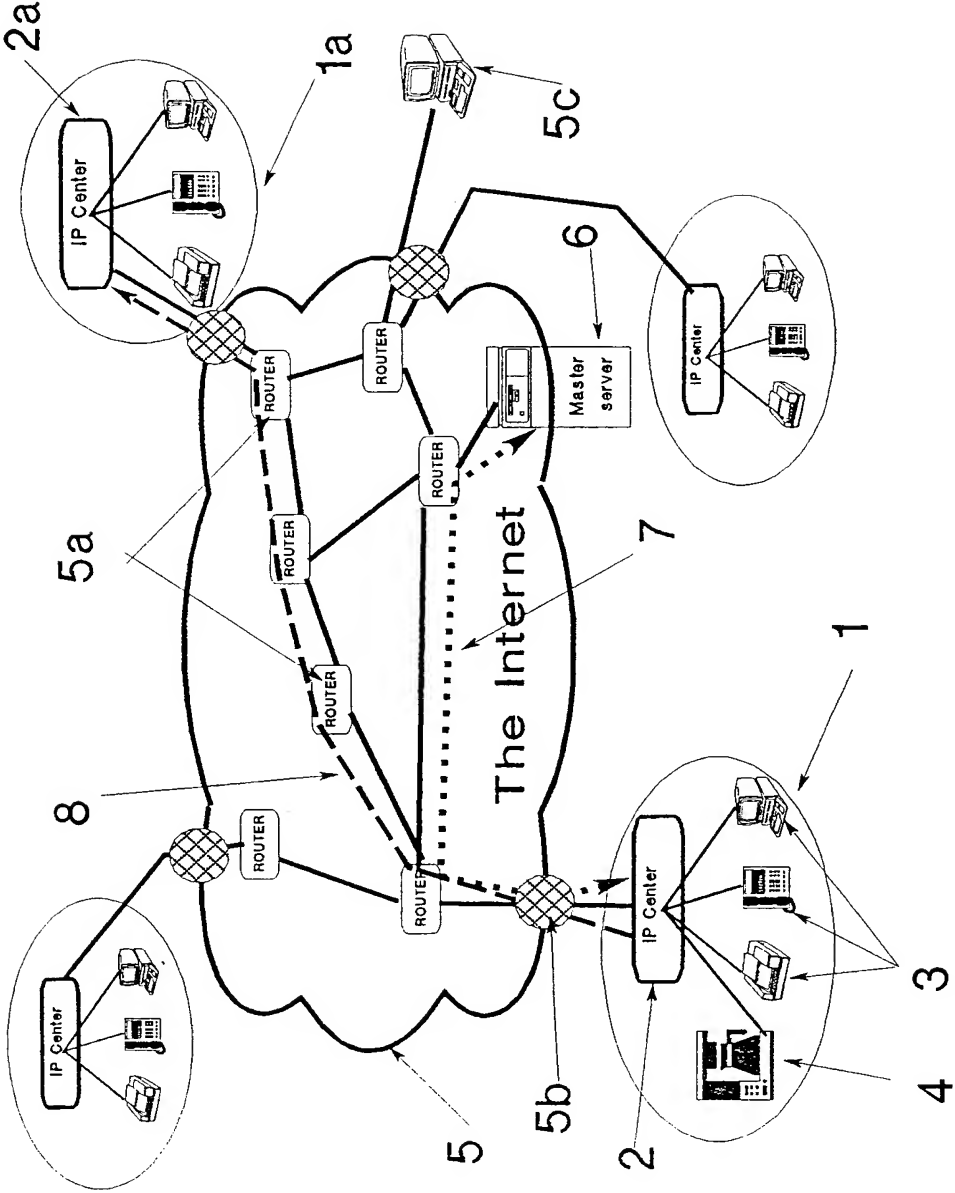
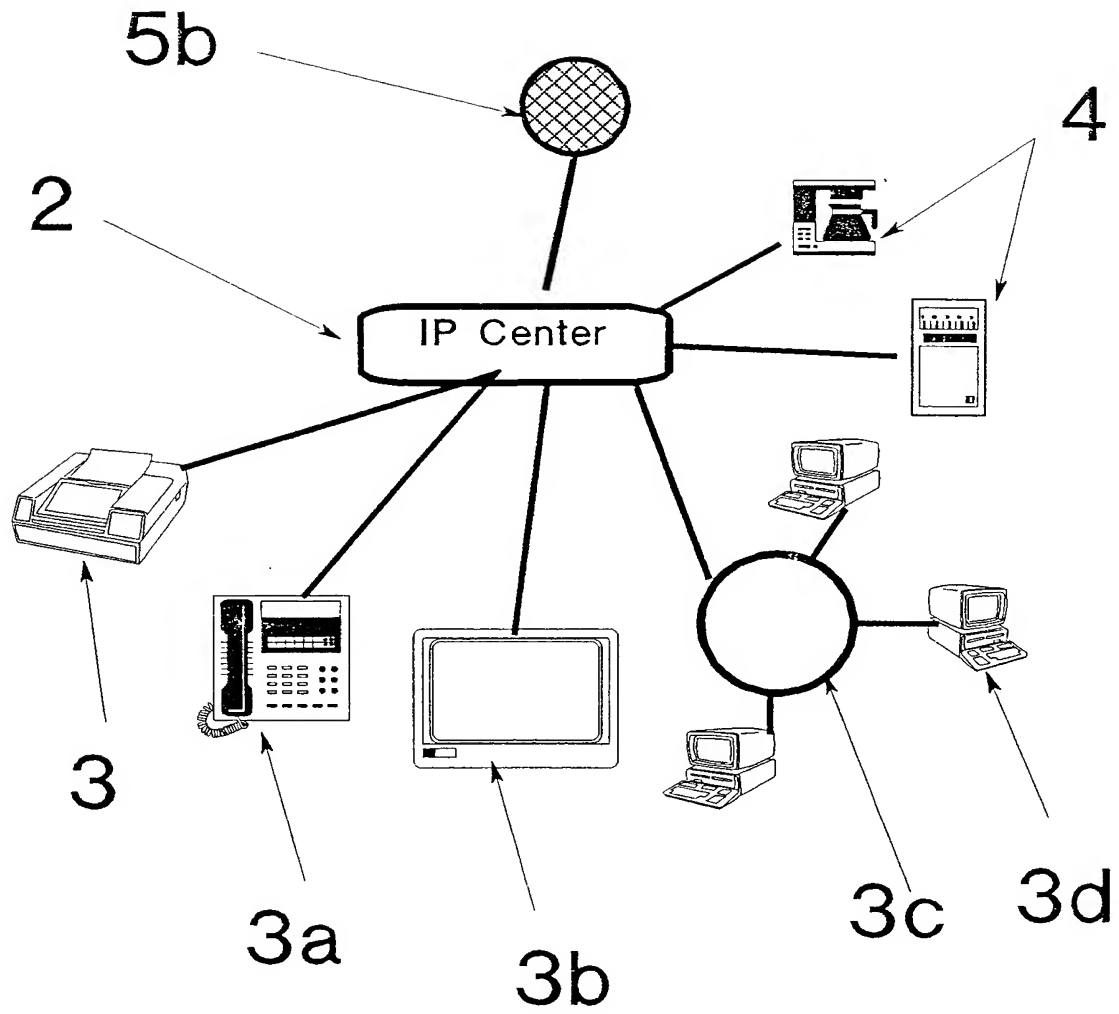


FIGURE 1

**FIGURE 2**

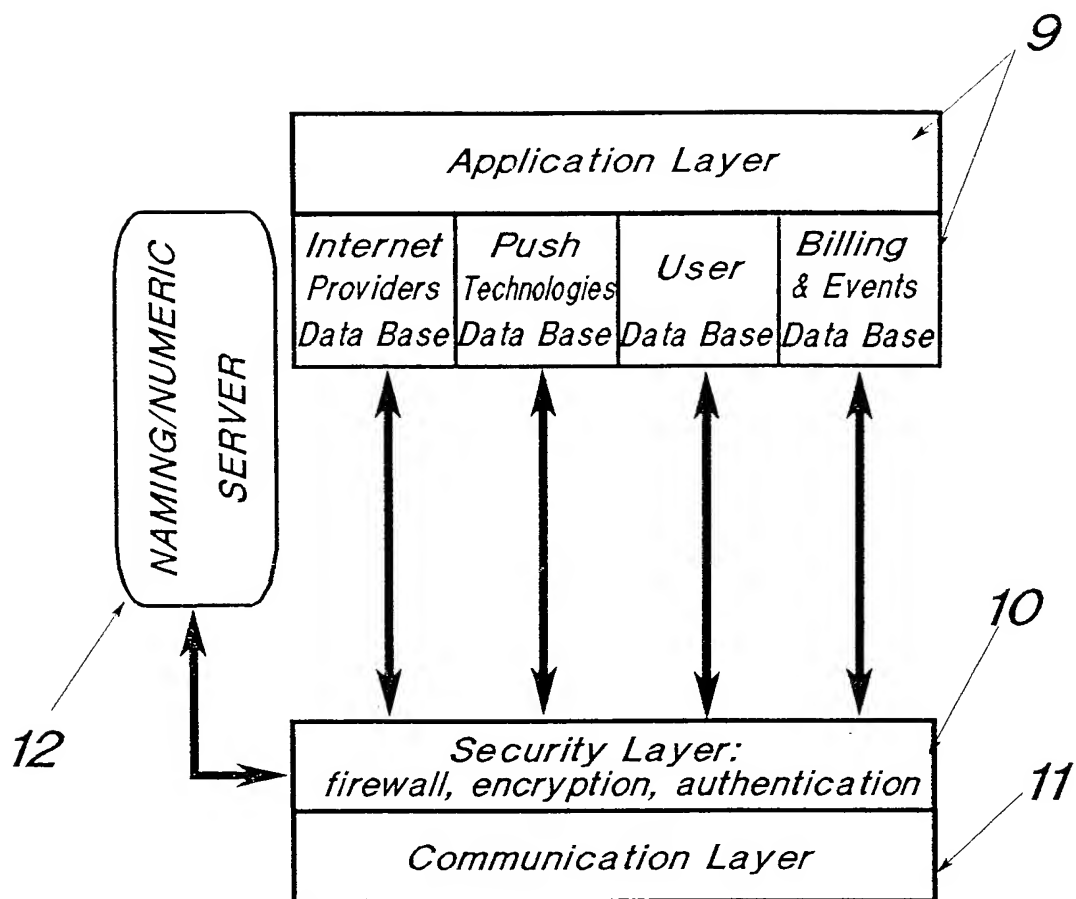
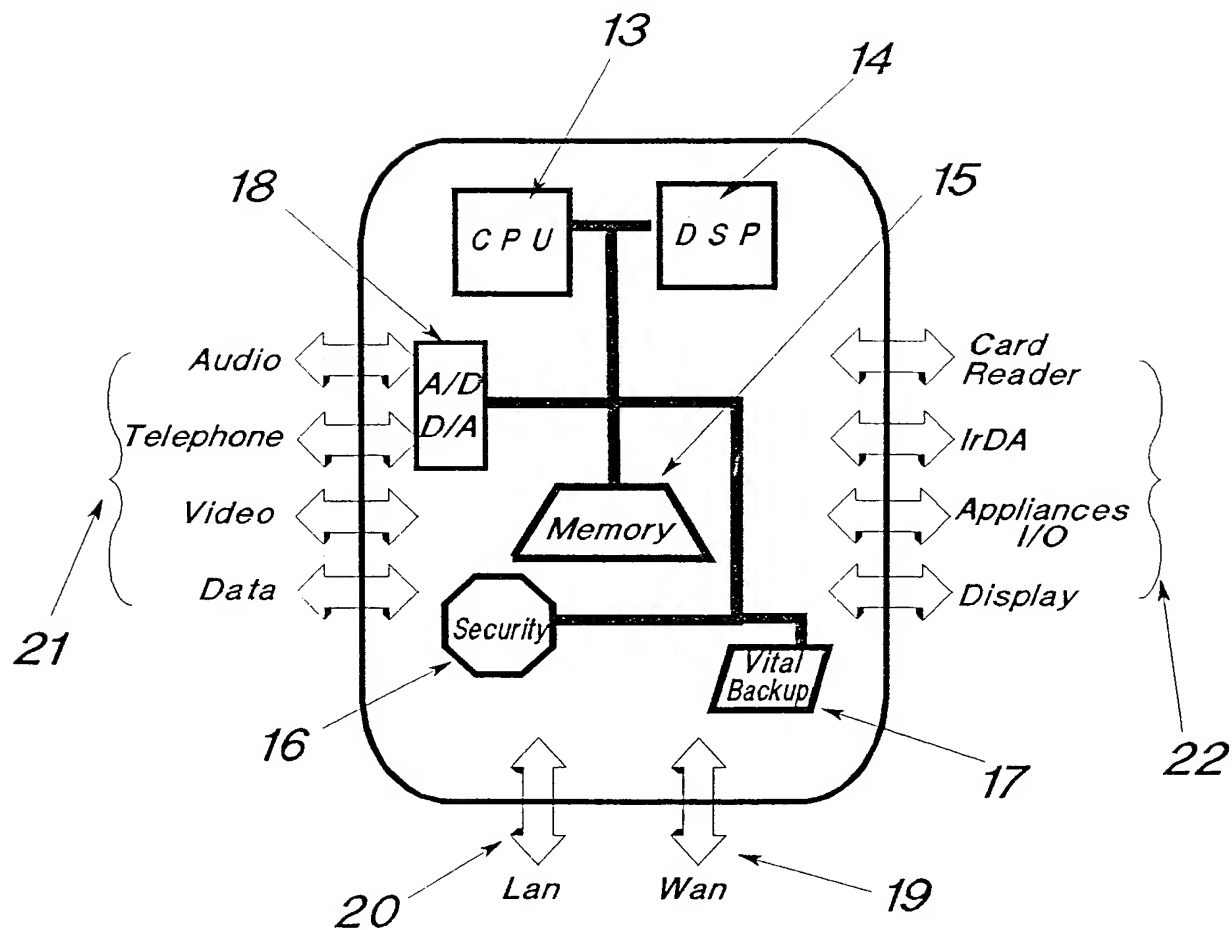


FIGURE 3

**FIGURE 4**

INTERNATIONAL SEARCH REPORT

International application No.

PCT / IL/ 01/ 00310

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 15/173

US CL : 709/238

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/238

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST, WEST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|-----------------------|
| X | US 5,974,449 A (CHANG et al) 26 October 1999 (26.10.1999), all, especially col. 5, line 60 - col. 6, line 47. | 1-20 |
| X | US 5,608,786 A (GORDON) 04 March 1997 (04.03.1997), col. 4, line 21 - col. 5, line 11. | 1-20 |
| A | US 6,229,883 B1 (KAKIZAKI et al) 08 May 2001 (08.05.2001) | 1-20 |

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

| | |
|---|--|
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